

Best Practice for GA use of tablets/EFBs



Introduction

There can be no doubt that the use of tablets in the cockpit will continue to increase and also that when used on a proper way this can lead to a significant increase of flight safety since such devices help to make a complex information readily available for the pilot.

In the airline sector there has for several years been clear certification requirements and from July 9th 2019 specific EASA rules on the use of tablets or so-called Electronic Flight Bags (EFBs) will also enter into effect for GA in Europe.

You will find the new rules for use of EFBs in complex (NCC) aircraft [here](#) and for use in smaller GA aircraft (NCO) [here](#).

For complex aircraft the rules are quite extensive and requires formal procedures in the operators OPS manual. For non-complex aircraft (NCO) the rules are less formal and generally can be summed up as what common sense would dictate.

As a help to get started with the new rules IAOPA Europe has prepared this guide with examples of best practice and good advise that you as pilot should consider before starting to use a tablet/EFB as a tool in the cockpit.

A few words of caution

No matter how good a tablet you have bought it is not a certified aviation device and you therefore have a higher risk of running into unexpected issues compared to certified avionics. This places a higher responsibility on you as a pilot for thoroughly testing that your EFB setup works properly during flight.

Most people using a tablet has probably experienced that the tablet suddenly refuse to work because it becomes too hot, locks up, requires a restart or needs a username and password to be entered. In everyday life this might be a nuisance but not a big issue. During flight on the other hand this might have much bigger consequences if you are not prepared for the situation. Either because you loose concentration or because you miss vital information such as charts, plates or weather information.

Therefore you should ensure that the safety of the flight is not compromised if your device should suddenly fail. You must have a plan for how to safely continue your flight if it should happen. It could be accomplished by having a spare device available, having essential data on paper or maybe a mobile phone. There is not a single answer as to what is a proper and sufficient backup solution. It depends entirely on your type of operation. Obviously flying VFR around your local airport or IFR across Europe requires different measures, but in any case remember that your back-up solution must be readily available, practical and operational. As a GA pilot it is your responsibility alone to make this assessment!

Mounting



Make sure that the tablet is securely mounted. It must be mounted so it can be used without risk of interfering with other equipment and so that it will stay in place even in severe turbulence. Make sure that cables are not lying loose so they can interfere with the controls of the aircraft or any other equipment. With the new EASA rules on EFBs these recommendations are now explicit requirements!

There are many good mounts for tablets which can be fastened in a way where the equipment will not obstruct your vision or the cockpit tasks.

If you mount it on the yoke, it is important to ensure that you still have full movement and that the tablet does not cover important instruments.

Remember to test the entire movement range of the yoke. Sometime you can be surprised how little room there is between your stomach and the tablet when you pull the yoke all the way back (!).



Examples on the use of 2 tablets in a Cessna 172



The following pictures are from a Cessna 172 where two ipads are used. One is mounted on a knee-board and the other with a RAM suction cup mount. The charging cable for the latter is a quality cable sufficiently long that it can follow the curve of the dashboard all the way around so it does not interfere with any controls or handles.



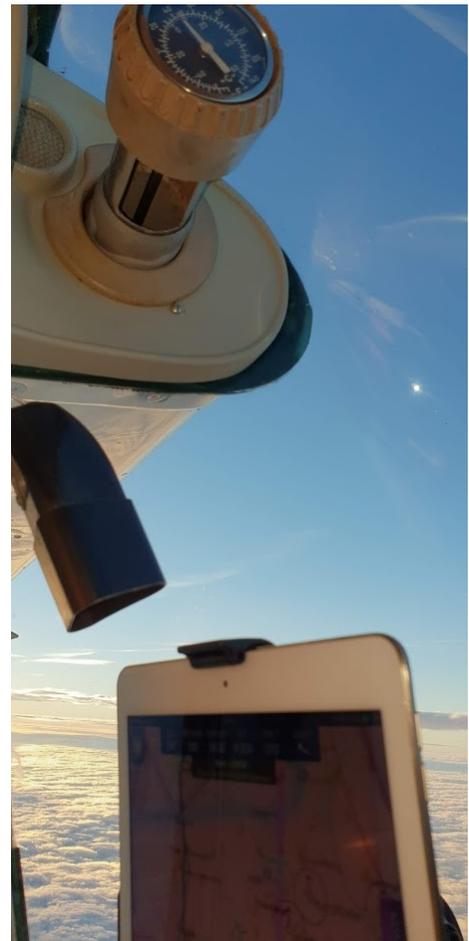
A special advantage of this mounting location is that the flashlight on the back of the ipad can be used as a backup lightsource should the electric power of the aircraft disappear. It can be a good idea to switch on the light before it becomes dark. Then you are prepared and don't suddenly need to

find out how to activate it if you lose electricity. It is a good idea to place red tape over the ipad flash, so you protect your night vision.

Access to cooling is always an important aspect to reduce the risk of your tablet overheating.

In the example to the right, the ipad is located right under the fresh air intake which gives a good possibility to cool the device during flight.

If you don't have the option to get airflow over the device then try as a minimum to avoid placing the device in direct sunlight. Direct sunlight significantly increases the risk of



overheating, even if the cabin has a normal temperature. If you use a knee-board, something as simple as changing leg can get the device in the shade, reduce glare and increase the readability of the screen.

Power



Make sure that there is sufficient battery time on the device for the full duration of the flight. Remember that typically the device will use more power during flight than during normal use. Aviation apps often require that the GPS is on and that screen light is on max for readability.

If you have a power source in the aircraft this gives you an advantage. Normally there are two possibilities: A cigarette lighter plugin or a certified USB output. The USB output is not exactly cheap. A certified USB charging port will often costs USD 400 plus installation, but is clearly the best solution.

If you are using a cigarette lighter adapter with a USB outlet then make sure to buy a plug in a good quality and which is CE labelled. The last thing you want is a plug of questionable quality which overheats or catches fire during flight. It can be a good idea to check it thoroughly at full load in for instance your car. Check how hot it becomes and if it can really charge the required number of devices simultaneously. First time you bring it in the aircraft pay special attention to electronic noise, which could be in the form of background noise on the radio. When you have decided which charger meets your requirements, then buy an extra, so you always have spare charger available during flight.



The alternative to having an electricity source in the aircraft is a battery powerbank. Often it can be placed in a side pocket without any issues. Also here it is important to ensure that the power bank is in a good quality, CE labeled and capable of supplying the required power.

Cables: Beware of cheap cables! Often cheap cables are of poor quality and not capable of supplying sufficient power. You might experience that the battery level keeps dropping even with external power connected. Therefore, check before flight that the cable and charger is able to charge the device at full load and bring an extra cable since experience shows that they do break more easily than you would probably expect.

SAFETY: Make sure before flight to have your cables neatly arranged so they cannot interfere with any control or handle during flight.

Use of Apps

Make sure to organize the apps you will need so they are easily accessible on the tablet screen, so you don't have to search for them during flight. Also make sure to practice using them before flight. One of the big advantages of using apps on your tablet is that you can train for free at home in your sofa. Many navigation apps has a simulator function. Use it!

Also make sure to be familiar with the basic features, shortcuts and limitations on your tablet in general.

SAFETY: In the cockpit your focus must always be on the flight. It is not the place to explore new exciting features of your aviation apps.

Two of the most obvious advantages with tablets are:

Moving map: whether you fly IFR or VFR a moving map increases situational awareness. An app can make it easy to get a quick overview of information that would normally be much harder to access and use efficiently. For instance it can be convenient to easily see your gliding distance corrected for actual wind. If it became necessary, this might be exactly what made you make the right decision. Many apps will also show you visually where there are active notams and will give you warnings before you enter a control zone or restricted area. A clear improvement in flight safety.

Plates: Another safety improvement is the presentation of plates. It is easy to find and access the right plates and if the runway changes it is easy to find the new plate (provided you trained this at home). Quite often the app will show you the position of your aircraft directly on the plate with a small aircraft symbol. This can be very convenient both when the plate is an instrument approach or a taxi diagram and again an improvement in flight safety.

No doubt that proper use of apps on your tablet increases flight safety by giving you a much better overview of the progress of your flight.

ipad specific tips & tricks for cockpit use

Use of split screen and several apps simultaneously

Remember that certain features are only active when the app runs in the foreground. It could be traffic alerts on the screen or to your headset. By using the split screen feature or app-over-app you can avoid this limitation:

To activate this on an iPad where you have your primary app running pull up from the bottom of the screen. Then you get a list of recently used apps. Now drag one of these to a desired location. Depending on where you release the app it will either activate split screen or float on top of the current app. If you placed an app on top of the primary app you can easily slide it out and back in with your finger in the top right corner of the screen.

If for instance you use the built-in note function on an iPad then the note-app can be placed on top of the navigation app and then be slided in and out with a finger-touch to the right or to the left in the top right corner of the screen. Together with an apple pencil you have an effective tool for taking notes, particularly if your tablet keyboard stole the location where you previously had your note paper.

Quick access to controlling screen background lighting

The lighting conditions in the cockpit can be tricky and it is important to be able to quickly regulate the screen background lighting. The easiest way to achieve this is to drag down from the top right corner to access the settings panel.

Quick access to the flash light

How do you quickly turn on the flashlight on your iPad if you suddenly need it as emergency lighting? Many will turn to a flashlight app from the appstore, but these typically will only work as long as the flashlight app runs in the foreground. It is therefore good to know that you can turn on and regulate the flashlight directly from the settings panel that you can slide in by dragging down from the top right corner of the screen.

Headset linked to your tablet

Many navigation apps will not only provide visual alerts on the screen but can also provide spoken warnings directly in your headset. It could be a warning about airspace, restricted areas or obstacles ahead. If you have an ADS-B In or FLARM receiver it could also be warnings about other traffic, and you might hear something like "traffic 2 o'clock 1 mile, 100 ft above".

A big advantage of getting the warnings directly in your headset is that you get the warnings without having to focus on the screen. In this way, your focus can stay where it should be: on traffic you can see through the windows. Yet, at the same time you will receive advice about other traffic directly in your ears. Used sensibly, advice about other traffic through your headset may help to increase your awareness on what happens outside the cockpit.

SAFETY: Remember that even with an ADS-B and FLARM receiver, there is still a lot of traffic that you cannot see electronically. The most important tool for seeing and avoiding other traffic under visual conditions therefore remains a good lookout through the window. Remember that you will not be alerted about aircraft equipped with a classic mode A, C or S transponder. You will

only be warned about aircraft equipped with ADS-B out or maybe FLARM (the latter primarily transmitted by gliders) .

Modern headsets like for instance Bose A20 has the option to connect to your tablet both via bluetooth and cable. Use of bluetooth reduces the cable clutter. Again, remember to practice at home how you operate the headset, adjust volume and adjusting which sound-channel has priority or how you want to mix sound from ATC and sound from your tablet. Note that older versions of the Bose A20 with bluetooth (from before approx. 2016) can only use the bluetooth connection for mobile phone calls and not for getting audio from your apps. To resolve this it is possible to upgrade the cable.

ADS-B IN og UAT Receivers

A combined ASB-B In / UAT receiver is yet another device to help get relevant information in the cockpit.

1: ADS-B Receivers

You receive the ADS-B signal from other aircraft equipped with ADS-B out and which transmit position data on 1090 MHz.

You will then be able to see these aircraft on your tablet or directly on your panel mounted GPS/MFD/PFD if you invested in a transponder with ADS-B in capability and depending on what equipment you have in the aircraft.

All aircraft with a MTOW over 5,7 tons or capable of cruising at speeds over 250 kts must be equipped with ADS-B out in Europe from the summer 2020. Virtually all new aircraft are delivered with this capability and most newer ultralight aircraft also come with ADS-B out as standard.

2: UAT receiver

UAT stands for "Universal Access Transceiver" and is a way for a ground station to transmit aviation related data on the 978 MHz frequency. Some smaller aircraft also transmit their position data on this frequency instead of the classic 1090 ADS-B frequency.

The types of data it is possible to receive through UAT is long:

TAF - METAR - SPECI - Regional Radar - Lightning - Winds & Temperature Aloft
AIRMET - SIGMET - NOTAM - PIREP - Turbulence - Icing - Cloud Tops - Graphical AIRMET

In the US this technology has been used for many years and hopefully UAT transmitters will also become more common in Europe in the not too distant future. Trials are already taking place in several European countries including Germany, UK, Finland and Denmark. Here you can for instance receive TAF, METAR and Radar images with precipitation and information about lightening strikes, icing, winds aloft etc.

The UAT signal can be received by small portable devices or by panel mounted avionics of a newer date. Mobile devices can only be used together with a tablet, and again you have the challenge of extra devices, charging and chords, but of course the price is much lower than a fixed installation. Some UAT receivers you can buy for just a few hundred Euros.

With a panel mounted ADS-B transponder you can get data shown directly on the aircraft displays and some solutions also allow you to have the data displayed on your tablet using a WiFi or bluetooth connection. Here you avoid the hassle of wires and additional external devices.

You can read more about the Danish UAT trail here:

<https://www.motorflyvning.dk/uat>

The UK trial is described here:

<https://uavionix.com/category/uat-in-uk/>